



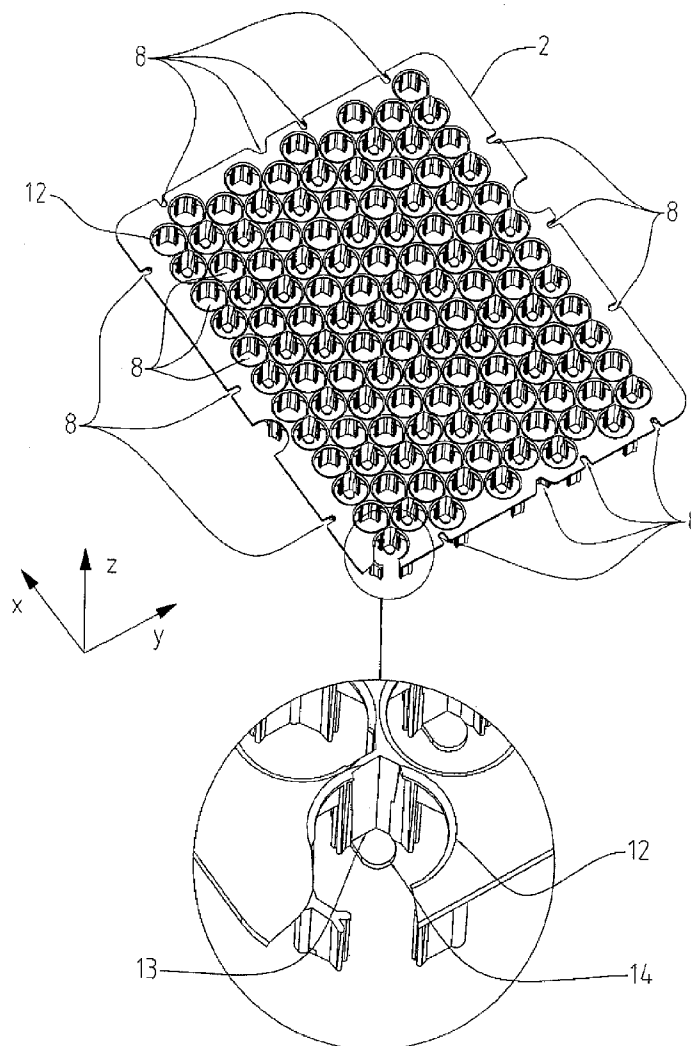
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(19) **United States**(12) **Patent Application Publication**
Nicoletti(10) **Pub. No.: US 2013/0048531 A1**(43) **Pub. Date: Feb. 28, 2013**(54) **PACKAGING STRUCTURE FOR
CONTAINERS FOR PHARMACEUTICAL USE****Publication Classification**(75) Inventor: **Fabiano Nicoletti**, Mira Venezia (IT)(51) **Int. Cl.**
B65D 1/34 (2006.01)(52) **U.S. Cl.** **206/557**(73) Assignee: **STEVANATO GROUP
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(2), (4) Date: **Dec. 9, 2011**(30) **Foreign Application Priority Data**

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(57) **ABSTRACT**

Packaging structure for containers (3, 3') for pharmaceutical use, comprising a tray (1) having an open side for introducing and extracting a support plane (2) of the containers (3, 3'), and a closing element (5) of the open side of the tray (1), said support plane (2) having a spatial prefixed distribution of seats (6) in which said containers (3, 3') can be precisely positioned without mutual contact, whereby the structure comprises diversification means of the engaging configuration between said support plane (2) and said tray (1) in order to maintain unchanged the points inside the tray (1) in which an end (3a, 3a1) of the containers (3, 3') is placed, with the variation of the height of the containers (3, 3') associated from time to time to the support plane (2).



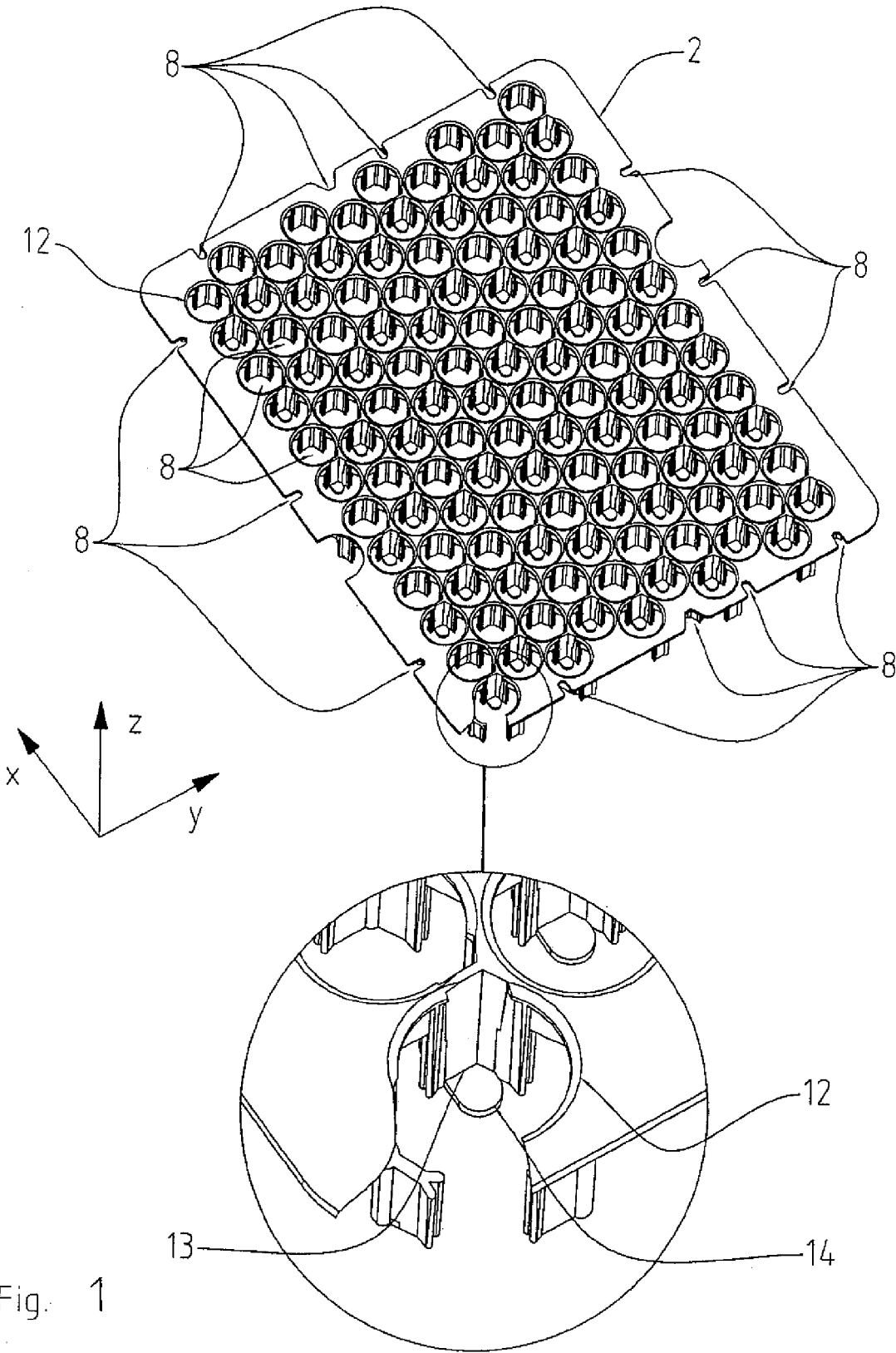
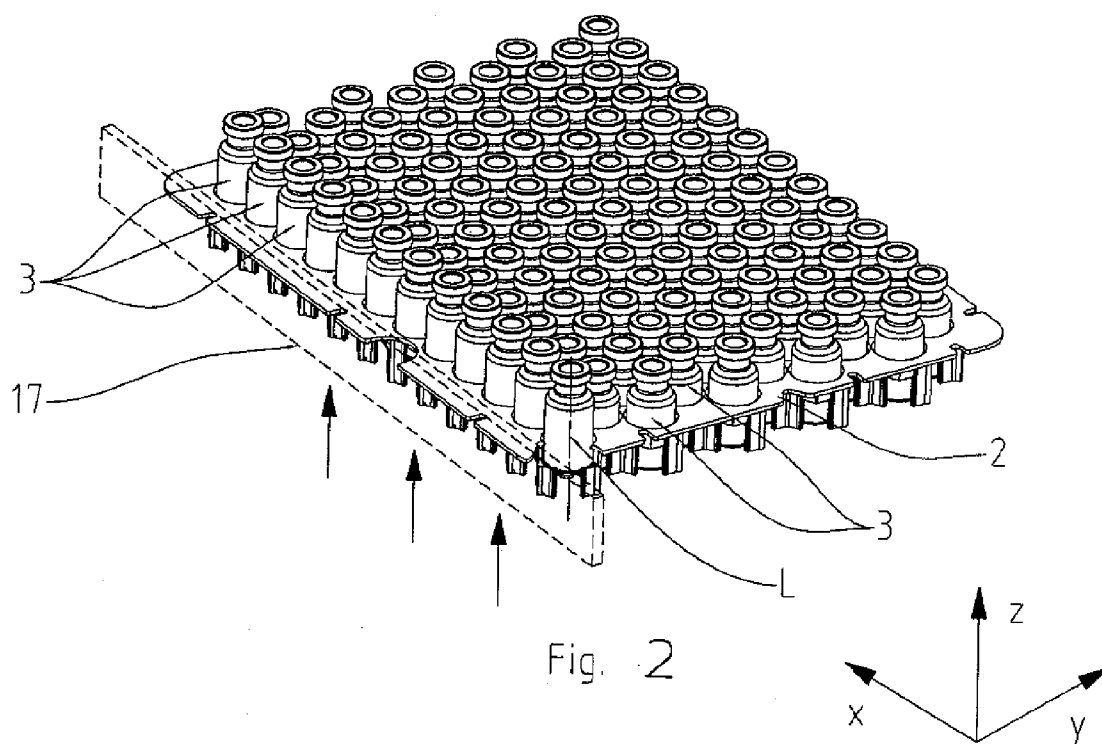
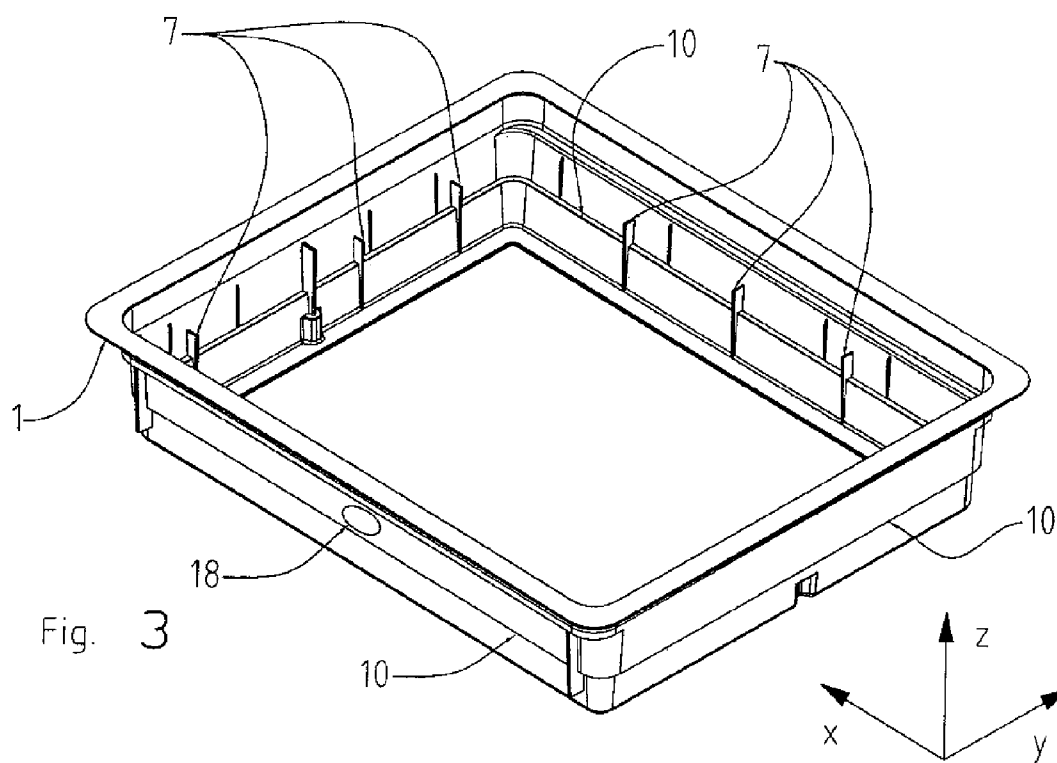
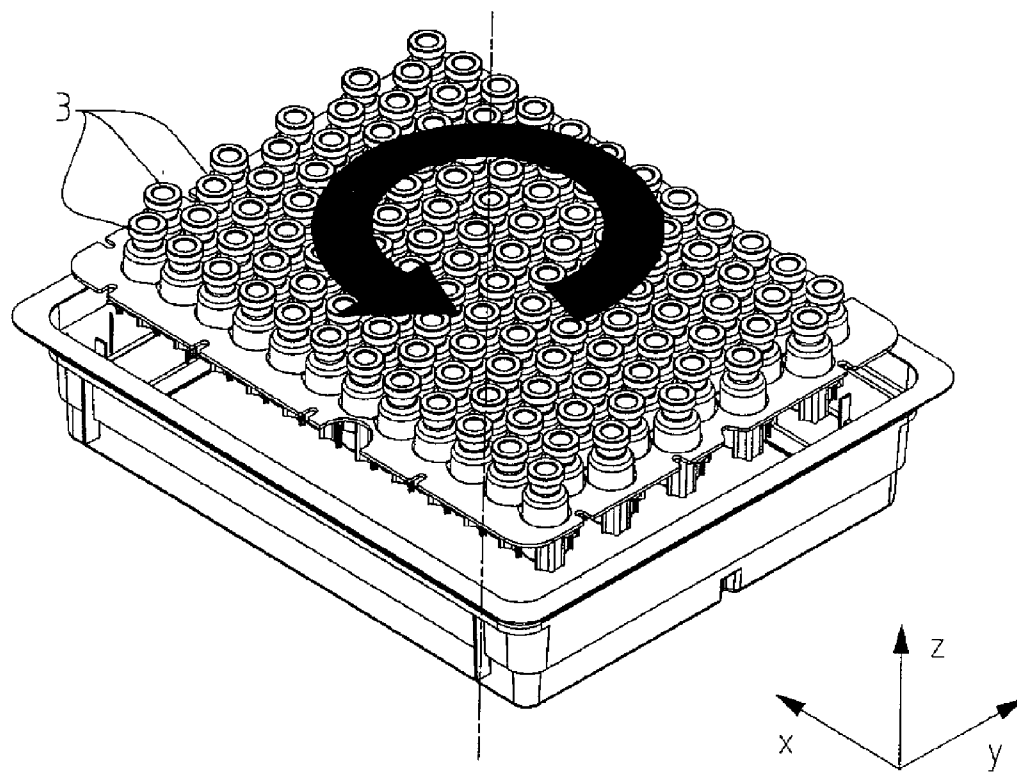


Fig. 1





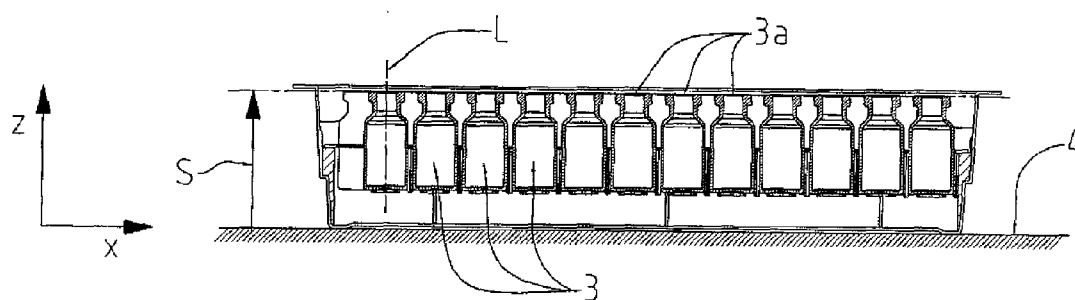


Fig. 4a

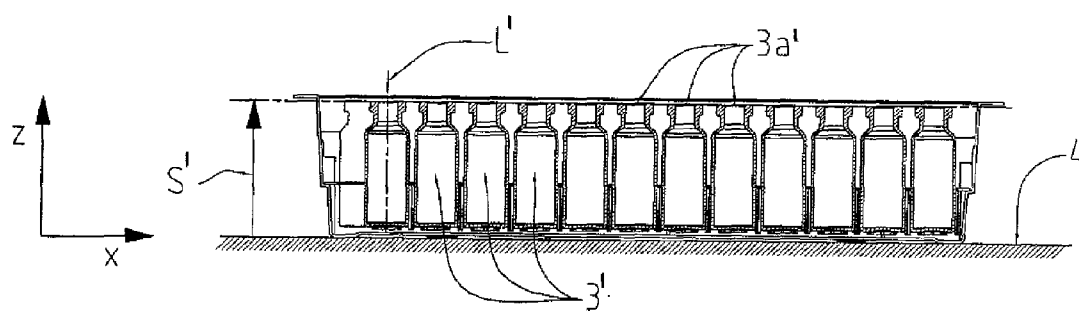
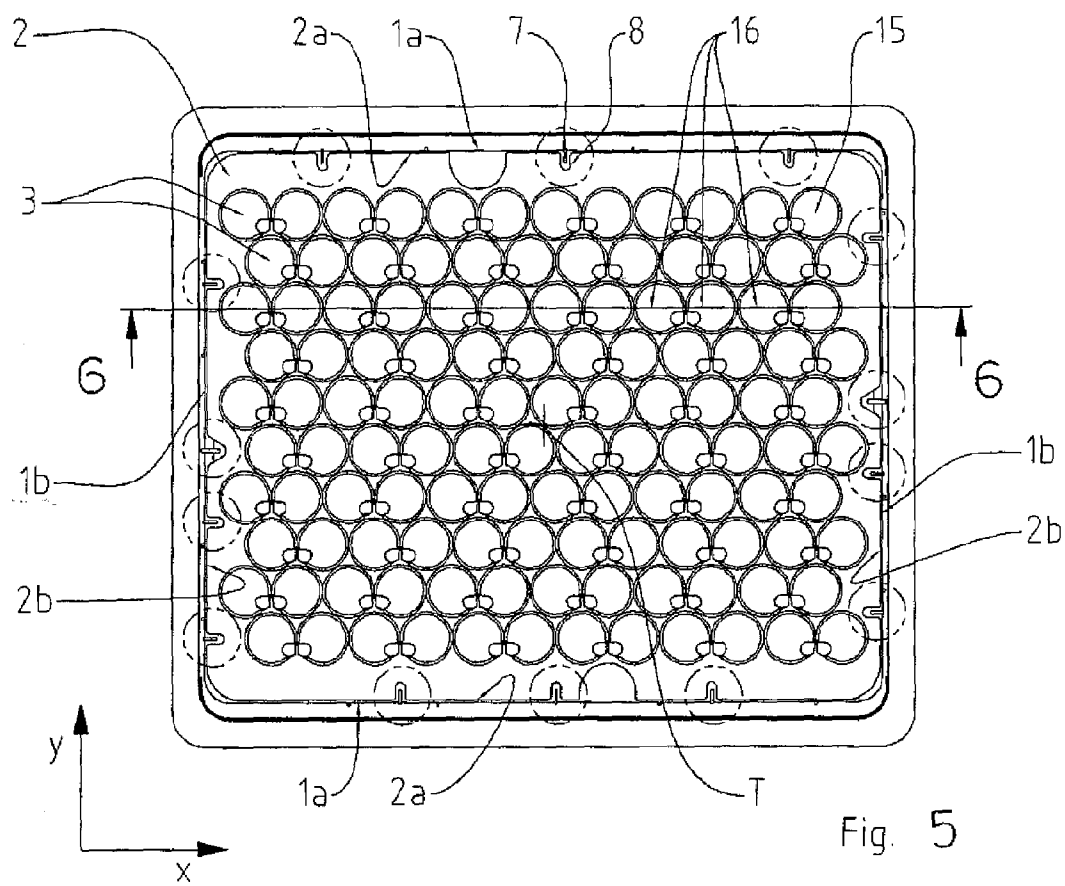
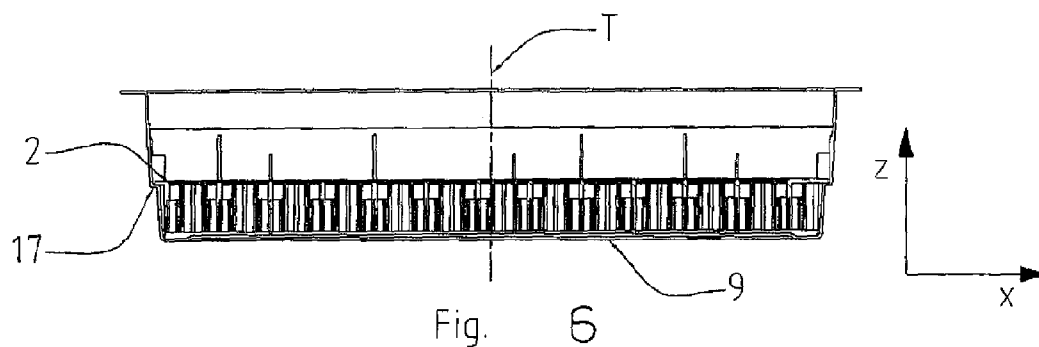
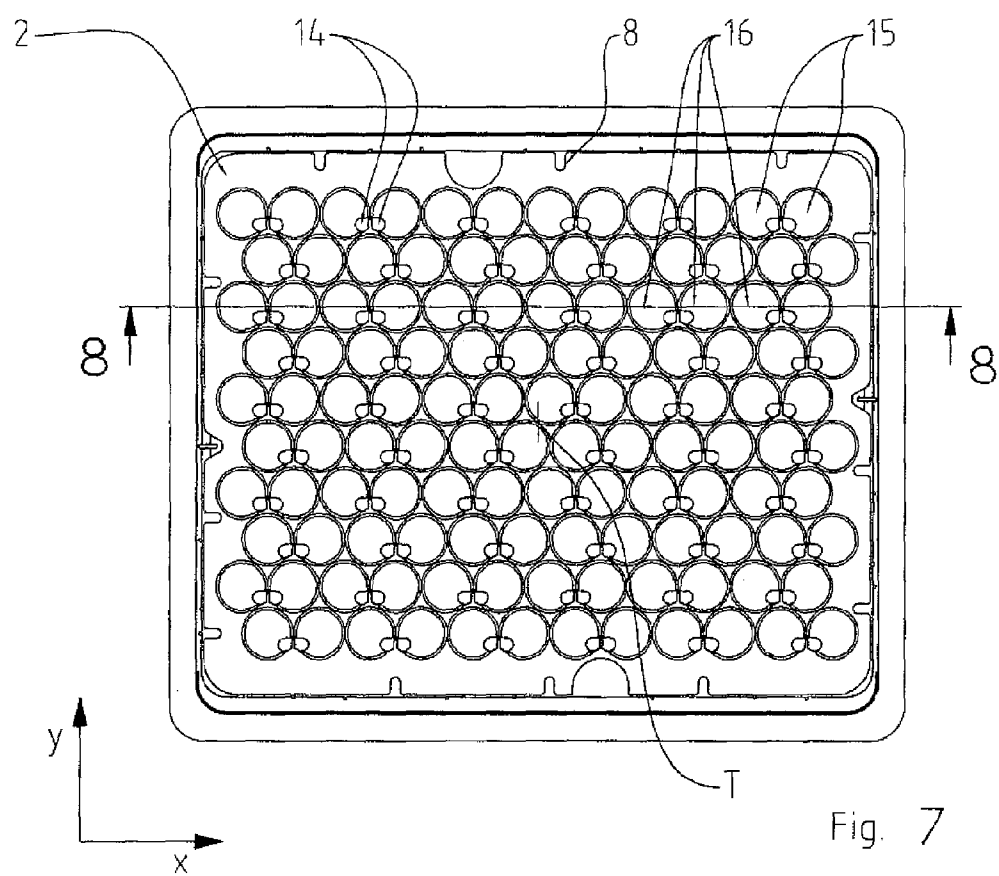
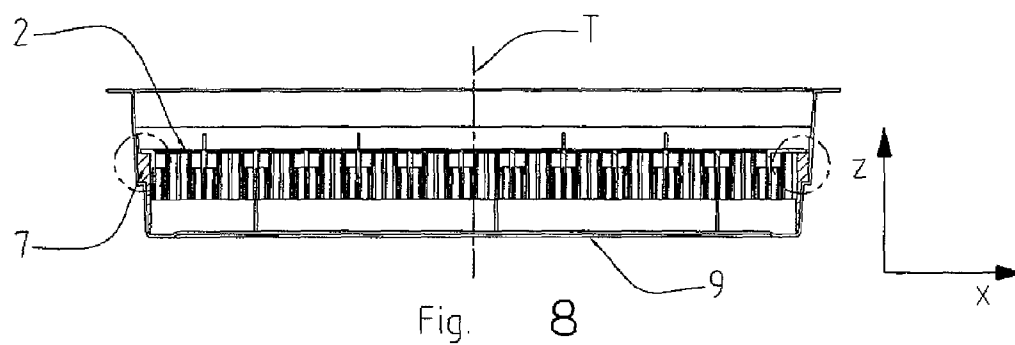


Fig. 4b





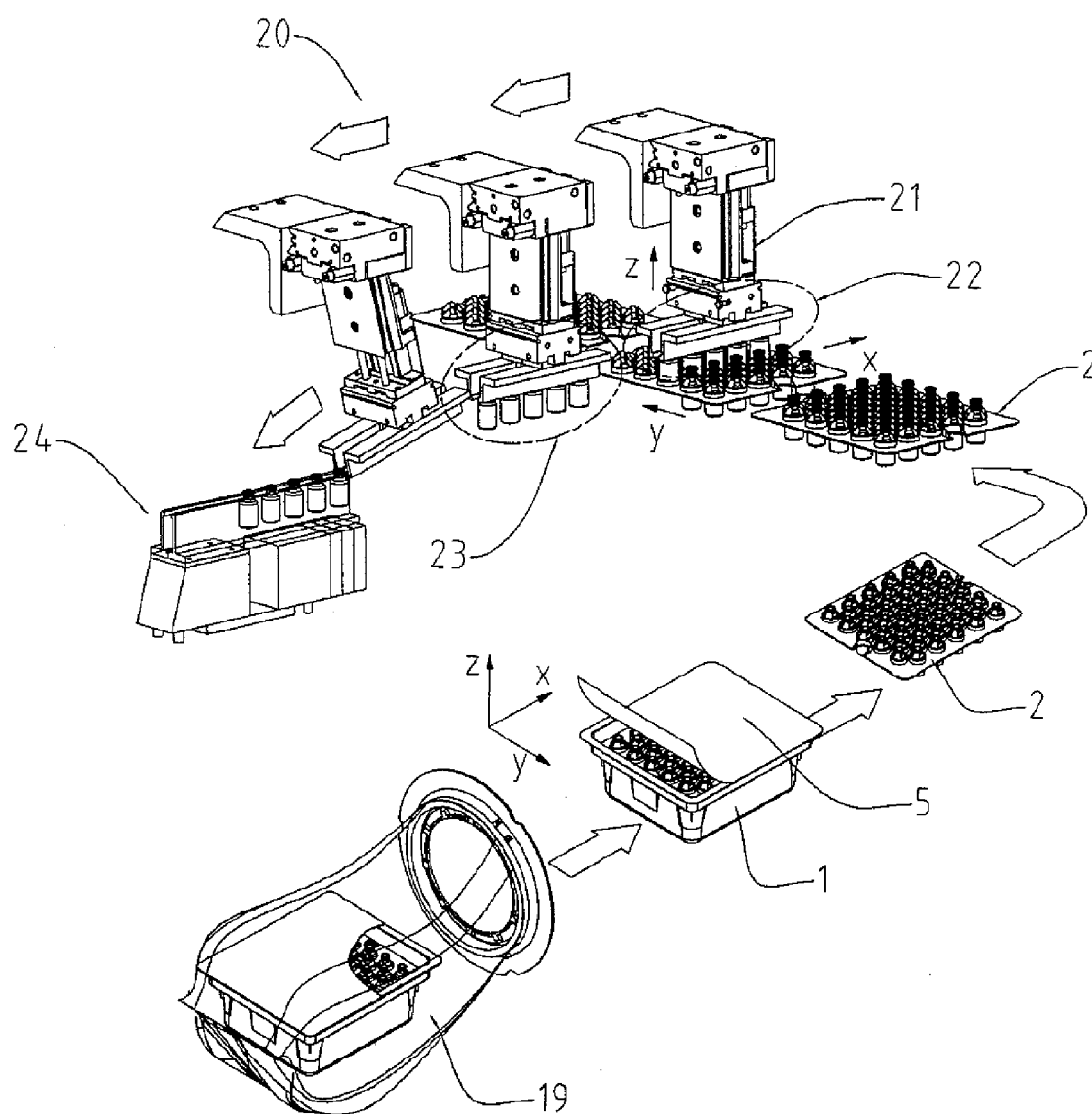


Fig. 9

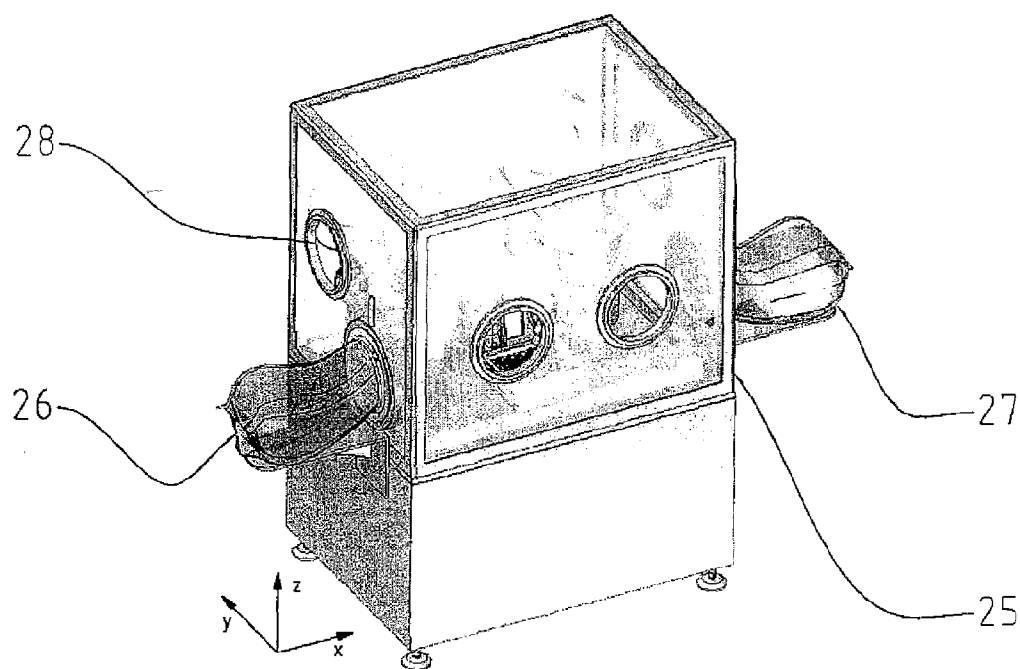


Fig. 10

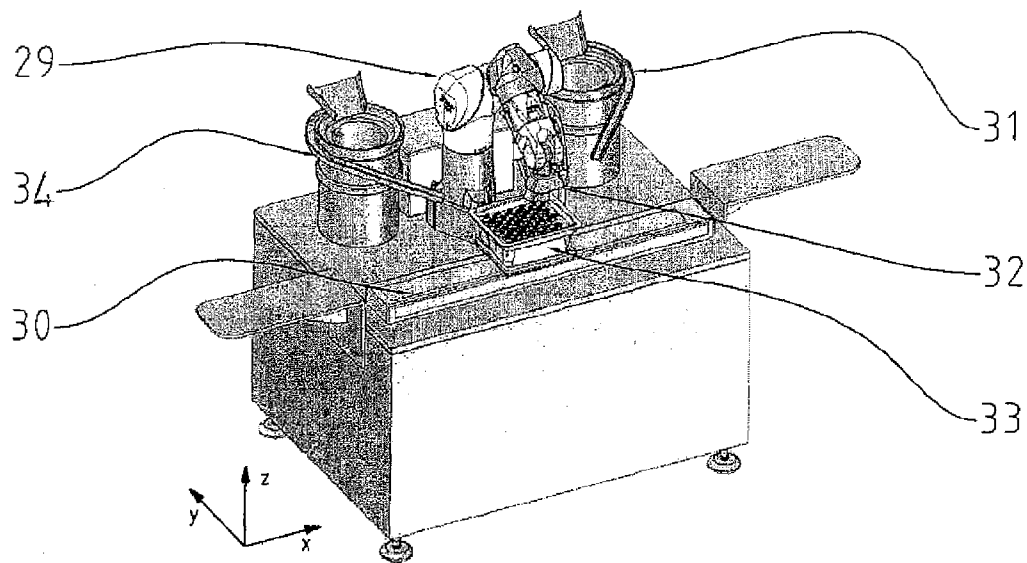


Fig. 11

PACKAGING STRUCTURE FOR CONTAINERS FOR PHARMACEUTICAL USE

[0001] The present invention refers to a packaging structure for containers for pharmaceutical use.

[0002] A packaging structure for containers for pharmaceutical use is known, comprising a tray supporting at its inside a support plane having a plurality of housing holes in which the containers are positioned with a vertical orientation.

[0003] Some containers like the syringes can be held in position by means of a simple rest of their flange on the peripheral edge of the housing holes.

[0004] Other containers which do not have protruding parts need suitable elements, permitting to maintain the same inside the housing holes.

[0005] Packaging systems for containers of this kind are known for example from the international patent application n. WO2009/015862.

[0006] The known packaging structures have a limited flexibility of use, because they are not suitable generally to be used efficiently and universally for packaging different sets of containers in which the containers of a set differ from those of another set for shape and/or size, generally for the height, and in case they are suitable for such an use, they are not able to permit in any case the automatic management of the various sets of containers, by means of processing machines intended for their handling, filling and eventual closure.

[0007] The technical scope of the present invention is therefore that to realize a packaging structure for containers for a pharmaceutical use, which permits to eliminate the technical drawbacks lamented in the known technique.

[0008] In the field of this technical scope, an aim of the invention is that to realize a packaging structure for containers for pharmaceutical use, which can be universally used to package sets of containers in which each set differs from the other for the height of the containers, and at the same time permits the automatic management of the specific set of containers, used from time to time.

[0009] Another scope of the invention is that to realize a packaging structure for containers for pharmaceutical use able to held firmly in position the containers, in a prefixed position in order to protect them from accidental breakings and in order to manage the same in an automatic way with a processing machine.

[0010] Another scope of the invention is that to realize a packaging structure for containers for pharmaceutical use, which guarantees the sterilization of the product, maintaining its sterility, its quality properties, the evidence of the integrity of the product, the identification and the traceability of the product, the transferring of the product, without compromising the previously listed properties. The technical scope, and also these and other scopes according to the present invention are reached by realizing a packaging structure for containers for pharmaceutical use, comprising a tray having an open side for introducing and extracting a support plane for containers, and a closing element of the open side of the tray, said support plane having a spatially prefixed distribution of seats in which said containers can be precisely placed at a mutual distance, characterized in that it comprises diversification means of the engaging configuration between said support plane and said tray in order to maintain unchanged the points inside the tray in which an end of the containers is placed, with the variation in height of the sets of containers from time to time associated to the support plane.

[0011] Preferably the support plane of the containers can be positioned parallel to the resting plane of the tray, and the containers can be positioned in said seats with their longitudinal axis orthogonal to the resting plane of the tray, and the diversification means modify the engaging position of said support plane in said tray, along the direction orthogonal to the resting plane of said tray.

[0012] The diversification means preferably comprise some protrusions, which can be provided with recesses in a conjugated form.

[0013] Preferably said recesses are positioned along the edge of said support plane and said protrusions are positioned along the inner surface of the lateral walls of said tray, and vice versa.

[0014] Preferably said support plane has a first engaging position at a first distance from the base of said tray when said protrusions are engaged in said recesses and the edge of the support plane rests on an inner peripheral shoulder of the lateral walls of said tray, and a second engaging position at a second distance from the base of said greater tray of said first distance, when said recesses are disengaged from said protrusions on which the edge of said support plane rests.

[0015] Preferably said protrusions and said recesses are positioned such that said first and second engaging positions are obtained by a 180° rotation of said support plane with respect to said tray, around its own central axis, orthogonal to the resting plane of the tray.

[0016] Preferably said seats comprise circular through holes, with a matrix disposition.

[0017] Preferably said support plane has, at each circular through hole, a system for resting a container.

[0018] Preferably said resting system has a resting portion, contained in the cylindrical space, comprised between the cylindrical generating elements of said circular hole and it is configured in order to liberate a diametric plane of said cylindrical space.

[0019] Preferably the free diametric spaces, corresponding to the holes of each rows of holes are mutually coplanar.

[0020] Preferably to the free diametric coplanar planes is associated a free total volume, so to permit the introduction from below of a rising element, simultaneous of one or more containers.

[0021] Preferably said closing element is an exfoliative sheet from the tray.

[0022] Preferably said closing element is in a selective material permeable to a sterilization gas of the contents of the tray.

[0023] Preferably the tray has a protective envelope to be transferred in a controlled zone.

[0024] Preferably to the tray an identification and traceability element is associated.

[0025] Further characteristics and advantages of the invention will be clearer from the description of a preferred but not exclusive embodiment of the packaging structure for containers for pharmaceutical use, according to the founding, here shown for indicative and non limiting way in the annexed drawings, in which:

[0026] FIG. 1 *1a* shows a perspective view of the support plane free from containers, and one enlarged detail of the same;

[0027] FIG. 2 shows a perspective view of a portion of the support plane with the housed containers and a handling beam of the rows of containers;

[0028] FIG. 3 shows a perspective view of the tray with a set of identical containers with a certain height;

[0029] FIG. 4a shows a top side view of the tray with the support plane in the first engaging position in which it houses a set of containers having a certain height;

[0030] FIG. 4b shows a top side view of the tray with the support plane in the second engaging position in which it houses a set of containers with a height lower than those shown in FIG. 4a;

[0031] FIG. 5 shows a plan view of the tray free from containers with the support plane in its first engaging position;

[0032] FIG. 6 shows a top side view of the tray, sectioned along the line 6-6 in FIG. 5;

[0033] FIG. 7 shows a plan view of the tray with the support plane in its second engaging position;

[0034] FIG. 8 shows a top side view of the tray, sectioned along the line 8-8 in FIG. 7;

[0035] FIG. 9 shows a possible automatic handling layout of the containers, with a processing machine;

[0036] FIGS. 10 and 11 show a different processing machine, shown with and without an insulator for clarity aims, suitable to process the containers according to the present invention.

[0037] With reference to the cited figures, a packaging structure for containers for pharmaceutical use is shown, for example glass or plastic bottles.

[0038] The packaging structure comprises a tray 1 having an open side for introducing and extracting a support plane 2 of the containers 3, 3' which can be positioned parallel with the resting plane 4 of the tray 1, and with a closing element 5 of the open side of the tray 1.

[0039] The support plane 2 has a spatially prefixed distribution of seats 6 in which the containers 3, 3' can be positioned at a mutual distance with their longitudinal axis L, L' orthogonal to the resting plane 4 of the tray 1.

[0040] The support plane 2 has a quadrangular shape with pairs of opposed parallel edges 2a, 2a and 2b, 2b.

[0041] Analogously the tray 1 has a quadrangular shape with a base 9 provided parallel to the resting plane 4 and pairs of opposed lateral walls 1a, 1a and 1b, 1b.

[0042] The packaging structure comprises diversification means of the engaging configuration between the support plane 2 and the tray 1 able to modify the engaging position of the support plane 2 in the tray 1 along the direction Z orthogonal to the resting plane 4 of the tray 1 in order to maintain unchanged the points inside the tray 1 in which an end 3a, 3a' of the containers 3, 3' is positioned, with the varying of the height of the containers 3, 3' of the container set 3, 3' which is used from time to time.

[0043] The diversification means are studied in order to guarantee the drive and the alignment of the containers 3, 3' during the various phases of the process.

[0044] It is clear that the height of the containers 3, 3' corresponds to their size in the direction of their longitudinal axis L, L'.

[0045] From the comparison between FIGS. 4a and 4b it is noted that the distance S of the end 3a of a container 3 from the base 9 of the tray 1 corresponds to the distance S' of the end 3a' of a container 3' from the base 9 of the tray 1.

[0046] The diversification means comprise protrusions 7 provided with recesses 8 in a conjugated form.

[0047] The support plane 2 has a first engaging position at a first distance from the base 9 of the tray 1 when the protrusions 7 are engaged in the recesses 8 and the edge of the support plane 2 rests on inner peripheral shoulder 10 of the lateral walls 1a, 1a and 1b, 1b of the tray 1, and a second engaging position at a second distance from the bottom 9 of the tray 1 greater than the first distance, when the recesses 8 are disengaged from the protrusions 7 on which the edge of the support plane 2 is resting.

[0048] The recesses 8 are positioned along the pairs of opposed parallel edges 2a, 2a and 2b, 2b of the support plane 2 whereas the protrusions 7 are positioned along the inner surface of the lateral walls 1a, 1a and 1b, 1b of the tray 1.

[0049] In particular, a first lateral wall 1a of the tray 1 has three protrusions 7 and a second lateral wall 1a has three protrusions 7 offset from those of the first lateral wall 1a along the common direction of the first and second lateral walls 1a.

[0050] A first lateral wall 1b of the tray 1 has four protrusions 7 and a second lateral wall 1b has four protrusions 7 offset from those of the first lateral wall 1b along the common direction of the first and second lateral wall 1b.

[0051] A first edge 2a of the support plane 2 has four recesses 8 and a second edge 2a of the support plane 2 has three recesses 8 offset from those of the first edge 2a along the common direction of the edges 2a.

[0052] A first edge 2b of the support plane 2 has four recesses 8 and a second edge 2b of the support plane 2 has four recesses 8 offset from those of the first edge 2b along the common direction of the edges 2b.

[0053] The protrusions 7 and the recesses 8 are positioned so that the passage between the first and second engaging position is conferred by rotation of 180° of the support plane 2 with respect to the tray 1 around its central axis T orthogonal to the resting plane 4 of the tray 1.

[0054] In practice, when the protrusions 7 are aligned with the recesses 8, these latter can slide along the protrusions 7 which extend themselves again longitudinally along the direction Z orthogonal to the resting plane 4, and the support plane 2 can move towards the base 9 of the tray 1 until it rests on the shoulder 10.

[0055] In the other hand, when the protrusions 7 are not aligned from the recesses 8, the protrusions 7 rest themselves on the support plane 2.

[0056] Let us consider now a Cartesian reference system in which X and Y correspond with the axis XY plane, corresponding with the resting plane 4 in which the base 9 of the tray 1 is housed and Z, as aforesaid, is orthogonal to the resting plane 4.

[0057] In order to guarantee that the points inside the tray 1 remain unchanged where an end 3a, 3a' of the containers 3, 3' at the varying of the height of the containers 3, 3' of the set of containers (size along the axis Z of the containers 3, 3' when associated to their seats 6), used from time to time, also the distribution of the seats 6 in the plane XY must be such to reproduce itself in the same way by rotation of 180° of the support plane 2 with respect to the tray 1 around its central axis T parallel to the Cartesian axis Z.

[0058] The seats 6 comprise circular through holes 12 with a matrix arrangement in directions X e Y.

[0059] At each hole 12 a system for resting a container 3, 3', in particular a foot 13. The foot 13 has a resting portion 14 contained in the cylindrical space 15 comprised among the generation lines of the hole 12 parallel with the axis Z.

[0060] Advantageously the portion 14 of the foot 13 is configured in order to free a diameter plane 16 of the cylindrical space 15.

[0061] More precisely, the diameter planes 16 free from the cylindrical spaces 15 corresponding to holes 12 of each row of holes 12 are mutually coplanar. In the FIGS. 5 and 7 they occupy parallel planes with respect to the axis XZ. This permit the automatic handling of the containers 3, 3' in rows, by means of a beam 17 positioned under the support plane 2, when this is extracted from the tray 1. The beam 17 is placed longitudinally and parallel with the axis X under a row of containers 3, 3' developing in the direction X, and it can be handled in direction Z.

[0062] The closing element 5 is a sheet free from foils to the tray 1 realized in a selectively permeable material with a sterilized process contained in the tray 1.

[0063] To the tray 1 an identification and traceability element 18 is associated and it is for example a code which can be decoded by means of RFID technology.

[0064] The tray 1 can have a housing 19 for protecting its transfer in a controller zone (for example in an area where the filling of the containers occurs)

[0065] The protective housing 19 can be closed or open and in particular it can be provided or not with a rapid transfer gate. Each protective housing 19 can contain one or more stacked trays 1, and it is formed, at least for one portion, by a sheet realized of a selectively permeable material with a sterilization process of the contents of the tray 1.

[0066] The packaging structure is used 1 for feeding directly and in an automatic way the containers 3, 3' with a spatially prefixed to a processing machine 20 for their handling.

[0067] The processing machine 20 can operate in the same way both in presence of containers 3, and of containers 3' because they, even if they have a different height, are directed to the processing machine 20 their end 3a, 3a' in their positions (see a comparison between FIGS. 4a and 4b).

[0068] The processing machine 20 comprises a robot arm 21 having a head 22 for the handle of the containers 3, 3'.

[0069] The robot arm 21 has a horizontal translation axis in the X direction, a vertical translation axis in the Z direction and a rotary axis according the rotary axis Y.

[0070] The handling head 22 has a rectilinear open groove 23 for handling a row of containers 3, 3'.

[0071] The support plane 2, after having been extracted from the outer housing 19 and free from the closing element 5, is handled towards the handling position by means of the handling head 22 in which the containers 3, 3' are directed, in rows oriented parallel to the axis X.

[0072] In particular the handling head 22 is initially external with respect to the shape of the support plane 2 and it has the groove 23 oriented parallel to the axis X.

[0073] The handling head 22 performs a translation of the axis X in order to insert the groove 23 in the neck of the row of containers 3, 3' aligned with the groove 23 itself.

[0074] In order to facilitate the extraction of the containers 3, 3' is actuated in direction Z the beam 17 which is oriented parallel to the axis X. The beam 17 causes a partial extraction of the row of containers 3, 3' which then must catch the handling head 22.

[0075] After having hanged the row of containers 3, 3' the handling head 22 performs a translation of the axis Z in order to rise again the row of containers 3, 3' which is hanged by separating it completely from the support plane 2.

[0076] Later on, the handling head 22 performs a translation along the X axis, in order to transport the row of containers 3, 3' fixed towards a conveying station 24 at which the

handling head 22 rotates around Y axis in order to discharge in the conveyor station 24 the fixed row of containers 3, 3'.

[0077] With reference to Figures FIGS. 10 and 11, the processing machine comprises an insulating cover 25 with a vertical, laminar airflow downwards, in order to maintain clean the inside of the containers 3, 3'.

[0078] The cover 25 has an inlet rapid transferring gate 26 of the containers 3, 3' and an outlet rapid transferring gate 27 of the containers 3, 3', besides other gates, of which a gate 28 for example for a handling by means of a glove (not shown)

[0079] The processing machine has a translation slid 30 with a movement directed step by step, in order to bring the containers 3, 3' from the inlet gate 26 to the reference position, under an anthropomorphic robot 29 and from there to the outlet gate 27.

[0080] At the opposite sides of the robot 29 a first vibration distributor 34, and a second vibration distributor 31 are provided. They contain accessories to apply to the containers 3, 3', for example one with plugs and the other with the ring crimp. The robot is able to recognize the position of the containers 3, 3', because they have a prefixed spatial position, and it provides, by means of a manipulator 32 before their filling, then at the closure, with a plug taken from one of the distributors and finally to the hermetic closure of the plug by application of the crimp ring.

[0081] The packaging structure for containers for pharmaceutical use so conceived is susceptible of various changes and variants, all in the scope of the inventive object; furthermore all the details can be substituted by technical equivalent elements.

[0082] For example, the number of engaging positions of the support plane with the tray can be greater than two, the passage among the various engaging configurations can be obtained also with a rotary translation movement of the support plane also different from the shown one, and also the structure of the diversification means.

[0083] In practice, the materials used, and also the sizes can be of any kind, according to the needs and to the state of the art.

1. A packaging structure for containers for pharmaceutical use, pretreated, sterile and ready to be used, comprising a tray having an open side for introducing and extracting a support plane of the containers, and a closing element of the open side of the tray, said support plane having a spatial prefixed distribution of seats in which said containers can be precisely positioned without mutual contact, characterized in that it comprises diversification means of the engaging configuration between said support plane and said tray in order to maintain unchanged the points inside the tray in which an end of the containers is placed, with the variation of the height of the containers of the container set associated from time to time to the support plane.

2. The packaging structure for containers for pharmaceutical use according to claim 1, characterized in that said support plane of the containers can be positioned and parallel to the resting plane of the tray, said containers can be positioned in said seats with their longitudinal axis orthogonal to the resting plane of the tray, and in that said diversification means modify the engaging position of said support plane in said tray along the direction orthogonal to said resting plane of said tray.

3. The packaging structure for containers for pharmaceutical use according to claim 1, characterized in that said

diversification means comprise protrusions provided with recesses in a conjugated form.

4. The packaging structure for containers for pharmaceutical use according to claim 1, characterized in that said recesses are positioned along the edge of said support plane and said protrusions are positioned along the inner surface of the lateral walls of said tray or vice versa.

5. The packaging structure for containers for pharmaceutical use according to claim 1, characterized in that said support plane has a first engaging position at a first distance from the base of said tray when said protrusions are engaged in said recesses and the edge of said support plane rests on an inner peripheral shoulder of the lateral walls of said tray, and a second engaging position at a second distance of said tray that is greater than the first distance when said recesses are disengaged from said protrusions on which the edge of said support plane rests.

6. The packaging structure for containers for pharmaceutical use according to claim 1, characterized in that said protrusions and said recesses are positioned so that said first and second engaging positions are obtained by a 180° rotation of said support plane with respect to said tray around its central axis orthogonal to the resting plane of the tray.

7. The packaging structure for containers for pharmaceutical use according to claim 1, characterized in that said seats comprise circular through holes with a matrix disposition.

8. The packaging structure for containers for pharmaceutical use, according to claim 7, characterized in that said support plane has, at each hole, a system able to sustain the containers.

9. The packaging structure for containers for pharmaceutical use according to claim 8, characterized in that said system able to sustain the containers has a resting portion

contained in the cylindrical space comprised between the cylindrical generators of said holes and it is configured in order to free a diametric plane of said cylindrical space.

10. The packaging structure for containers for pharmaceutical according to claim 9, characterized in that the diametric planes free from the cylindrical spaces corresponding to holes of each row of holes are mutually coplanar.

11. The packaging structure for containers for pharmaceutical use according to claim 10, characterized in that to the free and coplanar diametric planes free total volume is associated, in order to permit the introduction from below of a rising element for a simultaneous action on one or more containers.

12. The packaging structure for containers for pharmaceutical use according to claim 1, characterized in that said closing element is an exfoliative sheet from the tray.

13. The packaging structure for containers for pharmaceutical use according to claim 1, characterized in that said closing element is of a selective material permeable to a sterilization process of the contents of the tray.

14. The packaging structure for containers for pharmaceutical use according to claim 1, characterized in that it has a closed protective housing, which guarantees the sterility of the tray or a housing having at least one rapid transferring gate for its introduction in a controlled zone.

15. The packaging structure for containers for pharmaceutical use, according to claim 1, characterized in that to the tray an identification and traceability element is associated.

16. Use of a packaging structure for containers for pharmaceutical use according to claim 1, in a process machine for the automatic movement and/or the automatic filling and/or for the automatic closure of the containers.

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